IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: Yadong Li et al.	:
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For: SYSTEMS AND METHODS FOR	:
IMPLEMENTING A SPECKLE	:
REDUCTION FILTER	:

APPELLANTS' BRIEF

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The Notice of Appeal in this Application was filed on October 25, 2010. This Appeal Brief is timely because it is being filed on November 9, 2010, which is within two months of the filing of the Notice of Appeal.

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This Brief contains the following sections under the headings and in the order set forth below.

I.   REAL PARTY IN INTEREST

The real party in interest in this appeal is GE Medical Systems Global Technology Company, LLC, whose address is 3000 North Grandview, Waukesha, WI 53188.

II.   RELATED APPEALS AND INTERFERENCES

A previous Notice of Appeal and Appeal Brief were filed in this Application (Serial No. 10/659,184) on September 2, 2009 and September 30, 2009, respectively. In response to the Appeal Brief filed in this Application on September 30, 2009, a Non-Final Office Action containing a new ground of rejection was mailed by the United States Patent Office on December 31, 2009.

III.   STATUS OF CLAIMS

Claims 28-47 are pending in the application and are the subject of this Appeal. Claims 28-47 stand rejected and are on appeal. Claims 1-27 have been canceled.

IV.   STATUS OF AMENDMENTS

A Final Office Action was mailed June 24, 2010 and rejected claims 28-47. In response to the Final Office Action, a Request for Reconsideration after Final was filed on August 2, 2010. The Request for Reconsideration after Final did not amend any of the pending claims. An Advisory Action was mailed on August 20, 2010. In response to the Advisory Action, a Notice of Appeal was filed on October 25, 2010.

V.   SUMMARY OF CLAIMED SUBJECT MATTER

The following summary does not limit the interpretation of the claims pending in the application that is the subject of this Appeal. Rather, the following summary is provided only to facilitate the Board's understanding of the subject matter of this Appeal. Various embodiments of the invention relate to a user interface for an ultrasound probe.

Independent claim 28 recites a method (page 9, paragraph 30 of the specification and Figures 7 and 8) for implementing a speckle reduction filter. The method includes receiving 120 (page 9, paragraph 30 of the specification and Figure 7) a processed data stream from a processor 14 (page 9, paragraph 20 of the specification and Figure 7), and filtering 124 (pages 9 and 10, paragraph 31 of the specification and Figure 7) the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream. The method also includes filtering (pages 12-14, paragraphs 35 and 39 of the specification and Figures 7 and 8) the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set. The method further includes simultaneously co-displaying 138 (pages 11 and 12, paragraphs 34 and 35 of the specification and Figures 7 and 8) on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream.

Independent claim 36 recites an ultrasound imaging system 10 (page 4, paragraph 19 of the specification and Figure 1). The ultrasound system 10 includes a transducer array 20 (pages 5 and 6, paragraphs 22-24 of the specification and Figure 2), a beamformer 12 (pages 4-6,

paragraphs 19, 20, and 22-24 of the specification and Figures 1 and 2), a processor 14 (pages 4

and 5, paragraphs 19-21 of the specification and Figure 1) for processing a receive beam from

the beamformer 12, and a scan converter and display controller 16 (page 4, paragraphs 19 and 20

of the specification and Figure 1) operationally coupled to the transducer array 20, the

beamformer 12, and the processor 14. The scan converter and display controller 16 is configured

to receive 120 (page 9, paragraph 30 of the specification and Figure 7) a processed data stream

from the processor 14 (page 9, paragraph 20 of the specification and Figure 7), and filter 124

(pages 9 and 10, paragraph 31 of the specification and Figure 7) the processed data stream with a

first value set of speckle reduction parameters to produce a first image data stream. The scan

converter and display controller 16 is also configured to filter (pages 12-14, paragraphs 35 and

39 of the specification and Figures 7 and 8) the processed data stream with a second value set of

speckle reduction parameters to produce a second image data stream, wherein the second value

set of speckle reduction parameters is different than the first value set, and simultaneously co-

display 138 (pages 11 and 12, paragraphs 34 and 35 of the specification and Figures 7 and 8) on

a common screen a first speckle-reduced image that is generated from the first image data stream

and a second speckle-reduced image that is generated from the second image data stream.

Independent claim 37 recites a computer readable medium storing a computer program

which, when executed by a processor 14 (pages 4 and 5, paragraphs 19-21 of the specification

and Figure 1), causes the processor 14 to perform a method (page 9, paragraph 30 of the

specification and Figures 7 and 8). The method includes receiving 120 (page 9, paragraph 30 of

the specification and Figure 7) a processed data stream from a processor 14 (page 9, paragraph

20 of the specification and Figure 7), and filtering 124 (pages 9 and 10, paragraph 31 of the

specification and Figure 7) the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream. The method also includes filtering (pages 12-14, paragraphs 35 and 39 of the specification and Figures 7 and 8) the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set, and simultaneously co-displaying 138 (pages 11 and 12, paragraphs 34 and 35 of the specification and Figures 7 and 8) on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream.

Independent claim 38 recites a method (page 9, paragraph 30 of the specification and Figures 7 and 8) for implementing a speckle reduction filter. The method includes receiving 120 (page 9, paragraph 30 of the specification and Figure 7) a processed data stream from a processor 14 (page 9, paragraph 20 of the specification and Figure 7), dividing 122 (page 9, paragraph 31 of the specification and Figure 7) the processed data stream into data subsets, and simultaneously filtering 124 (pages 9 and 10, paragraph 31 of the specification and Figure 7) the data subsets by using a speckle reduction filter to produce filtered data subsets. The method also includes producing 128 (page 10, paragraph 32 of the specification and Figure 7) an image data stream based on the filtered data subsets. The filtering step 124 is based on adjustable speckle reduction parameters. The method further includes changing (pages 13 and 14, paragraph 39 of the specification and Figures 7 and 8) values of the speckle reduction parameters between different first and second value sets to form first and second image data streams, and simultaneously co-displaying 138 (pages 11 and 12, paragraphs 34 and 35 of the specification and Figures 7 and 8)

a first image and a second image on a common screen. The first image is generated from the first image data stream, and the second image is generated from the second image data stream. The first image and the second image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively.

Independent claim 46 recites a computer readable medium storing a computer program which, when executed by a processor 14 (pages 4 and 5, paragraphs 19-21 of the specification and Figure 1), causes the processor 14 to perform a method (page 9, paragraph 30 of the specification and Figures 7 and 8). The method includes receiving 120 (page 9, paragraph 30 of the specification and Figure 7) a processed data stream from a processor 14 (page 9, paragraph 20 of the specification and Figure 7), dividing 122 (page 9, paragraph 31 of the specification and Figure 7) the processed data stream into data subsets, and simultaneously filtering 124 (pages 9 and 10, paragraph 31 of the specification and Figure 7) the data subsets by using a speckle reduction filter to produce filtered data subsets. The method also includes producing 128 (page 10, paragraph 32 of the specification and Figure 7) an image data stream based on the filtered data subsets. The filtering step 124 is based on adjustable speckle reduction parameters. The method further includes changing (pages 13 and 14, paragraph 39 of the specification and Figures 7 and 8) values of the speckle reduction parameters between different first and second value sets to form first and second image data streams, and simultaneously co-displaying 138 (pages 11 and 12, paragraphs 34 and 35 of the specification and Figures 7 and 8) a first image and a second image on a common screen. The first image is generated from the first image data stream, and the second image is generated from the second image data stream. The first image

and the second image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively.

Independent claim 47 recites an ultrasound imaging system 10 (page 4, paragraph 19 of the specification and Figure 1). The ultrasound system 10 includes a transducer array 20 (pages 5 and 6, paragraphs 22-24 of the specification and Figure 2), a beamformer 12 (pages 4-6, paragraphs 19, 20, and 22-24 of the specification and Figures 1 and 2), a processor 14 (pages 4 and 5, paragraphs 19-21 of the specification and Figure 1) for processing a receive beam from the beamformer 12, and a scan converter and display controller 16 (page 4, paragraphs 19 and 20 of the specification and Figure 1) operationally coupled to the transducer array 20, the beamformer 12, and the processor 14. The scan converter and display controller 16 is configured to receive 120 (page 9, paragraph 30 of the specification and Figure 7) a processed data stream from the processor 14 (page 9, paragraph 20 of the specification and Figure 7), divide 122 (page 9, paragraph 31 of the specification and Figure 7) the processed data stream into data subsets, and simultaneously filter 124 (pages 9 and 10, paragraph 31 of the specification and Figure 7) the data subsets by using a speckle reduction filter to produce filtered data subsets. The scan converter and display controller 16 is also configured to produce 128 (page 10, paragraph 32 of the specification and Figure 7) an image data stream based on the filtered data subsets. The filtering step 124 is based on adjustable speckle reduction parameters. The scan converter and display controller 16 is further configured to change (pages 13 and 14, paragraph 39 of the specification and Figures 7 and 8) values of the speckle reduction parameters between different first and second value sets to form first and second image data streams, and simultaneously co-display 138 (pages 11 and 12, paragraphs 34 and 35 of the specification and Figures 7 and 8) a

first image and a second image on a common screen. The first image is generated from the first

image data stream, and the second image is generated from the second image data stream. The

first image and the second image are speckle-reduced images using the speckle reduction

parameters of the first value set and the speckle reduction parameters of the second value set,

respectively.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 28, 30, 32, 34, 35, and 37 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,674,879, hereafter "Weisman", in view of U.S. Patent Publication No. 2003/0234876, hereafter "Bloom".

Claim 29 is rejected under 35 U.S.C. §103(a) as being unpatentable over Weisman and Bloom in view of U.S. Patent 5,954,653, hereafter "Hatfield".

Claim 31 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman and Bloom in view of U.S. Patent No. 4,887,306, hereafter "Hwang".

Claim 33 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman and Bloom in view of U.S. Patent No. 6,879,988, hereafter "Kamath".

Claim 36 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman and Bloom in view of U.S. Patent No. 5,322,067, hereafter "Prater".

Claims 38, 40, 42, and 44-46 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman and Bloom in view of Kamath.

Claim 39 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman, Bloom, and Kamath in view of Hatfield.

Claim 41 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman and Kamath in view of Hwang.

Claim 43 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman in further view of Kamath in view of Examiner's Official Notice.

Claim 47 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Weisman, Bloom, and Kamath in view of Prater.

VII. ARGUMENT

Appellants respectfully submit that each claim in the pending application is patentable over the cited references. Appellants traverse the rejections of claims 28-47. Appellants request that the rejections be withdrawn, and request that all presently pending claims be allowed. In support of these requests, a discussion regarding the patentability of the claimed recitations is set forth below.

Under 35 U.S.C. §103, patentability is precluded if the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made. Obviousness is a conclusion of law based upon a number of underlying factual inquiries. Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966). In KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007), the Supreme Court rejected a rigid approach to the determination of obviousness. Id. at 415. But, merely pointing out that each element in a claim was known in the prior art may be insufficient to render the claim obvious. Id. at 418 ("[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."). Some articulated reasoning with rational underpinning must be provided to support an obviousness rejection. Id. ("[R]ejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.").

A.   **Independent Claims 28 and 37 - rejected under § 103 As Unpatentable over**
       Weisman

Appellants submit that the Final Office Action fails to set forth a prima facie case of obviousness with respect to claims 28 and 37. As will be discussed below in more detail, there is no legitimate reason to combine Weisman with Bloom.

Independent claim 28 recites a method for implementing a speckle reduction filter, wherein the method includes "filtering the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream", "filtering the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set", and "simultaneously co-displaying on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream." Independent claim 37 recites a computer readable medium storing a computer program which, when executed by a processor, causes the processor to perform a method that includes "filtering the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream", "filtering the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set", and "simultaneously co-displaying on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream."

Weisman describes and illustrates a quad display of a captured echocardiogram raw data

image, a speckle reduced image, an edge detected image, and a color quantization image. The speckle reduced image is generated by applying speckle reduction parameters to the raw image. A default speckle reduction is performed using moderate speckle reduction parameters, but light or heavy speckle reduction parameters may be chosen instead of moderate. The edge detected image and the color quantization image are generated from edge detection and color quantization parameters, respectively, that are applied to the speckle reduced image.

Bloom describes a system and method for generating multiple processed images from a single captured image generated by an electronic imaging device, such as a digital camera. In one embodiment, a digital camera includes multiple sets of operating parameters. For each image captured by the digital camera as raw data, the data is processed according to each parameter set prior to compression, storage in temporary memory, and ultimate upload onto a computer or other permanent storage device. Bloom describes processing the images captured by the digital camera for contrast, tone mapping, sharpness, and illuminant correction. Nowhere does Bloom describe the filtering process of speckle reduction, as conceded by the Office.

The Final Office Action asserts that "[a]pplying Bloom to Weisman would result in apply[ing] more than one of the speckle reduction filters in Weisman to the image and simultaneously displaying the differently filtered versions to the user so that they can select the best filtered image." (See page 3 of the Final Office Action). The Advisory Action additionally states that "Weisman and Bloom are about filtering an image and giving a user options for adjusting the filtering of the image to provide an image the user finds the most suitable" and "[t]he fact that the proccessing filters are different, and the type of images are different does not make the references non-analogous art." But, there is no legitimate reason to combine Weisman

with Bloom as asserted by the Final Office Action. Weisman is concerned with diagnostic ultrasound imaging, or echocardiography, to evaluate the condition of the heart. Weisman describes that "it is desired to provide a user-friendly echocardiography workstation that improves image quality, provides automatic edge detection, quantitates endocardial wall movement, corrects for cardiac translation, calculates 3-D left ventricle volume, and assists the physician with the interpretation of echocardiograms." (See column 2, lines 35-42 of Weisman). In contrast, Bloom is merely concerned with digital still photography using a conventional digital camera. The digital camera disclosed by Bloom is not capable of producing ultrasound images of the heart, much less images of any other internal volume of the body and/or using any other type of imaging for producing images of internal volumes of the human body. While an ultrasound system includes a relatively large amount of processing power to process relatively large sets of ultrasound image data, a conventional digital camera such as that disclosed by Bloom has limited processing power and is not capable of processing the relatively large sets of ultrasound data. Rather, the digital camera of Bloom merely takes still photographs of external objects. Bloom is therefore not analogous art to Weisman, especially because the processing filters and the type of images are different. One skilled in the art would not look to a conventional digital camera that takes still photographs to improve upon an echocardiography workstation.

In the Background of the Invention, Weisman states that "speckle noise and poor resolution can compromise the clinical utility of images of any patient produced by even the most sophisticated ultrasound scanners." (See column 1, lines 39-45 of Weisman). Weisman is concerned with techniques for reducing speckle noise while preserving and enhancing the

integrity of the myocardial borders and other cardiac structures. (See column 1, lines 53-57 of Weisman). In other words, the speckle reduction of Weisman is used to increase the viewability of diagnostically relevant images to preserve the clinical utility of such images. In contrast, Bloom is concerned with the variance in picture quality based on exposure conditions. (See page 1, paragraph [0002] of Bloom). Bloom does not even describe the filtering process of speckle reduction or any process similar to speckle reduction. The filtering processes described by Bloom, namely processing the images captured by the digital camera for contrast, tone mapping, sharpness, and illuminant correction, bear no relevance to speckle reduction or increasing the viewability and clinical utility of diagnostically relevant images. Rather, the filtering processes described by Bloom are merely used to allow a user to select the most aesthetically pleasing image. Bloom is therefore not analogous art to Weisman. One skilled in the art would not look to the filtering processes of Bloom for techniques that reduce speckle noise and/or increase the viewability and clinical utility of a diagnostically relevant image.

The Final Office Action also asserts, on page 5, that it would be obvious to combine Weisman and Bloom "for the purpose of allowing the operator to choose the best speckle-reduced image." But, the filtering processes described by Bloom would not help an operator to choose the best speckle-reduced image. Rather, the filtering processes described by Bloom bear no relevance to reducing speckle noise. Accordingly, the multiple processed images displayed by Bloom would not instruct one skilled in the art to apply different levels of speckle reduction to the same raw image. No legitimate reason has therefore been provided for combining Weisman with Bloom and thus the Final Office Action has not set forth a prima facie case of obviousness.

It is further submitted that Weisman teaches away from the combination with Bloom asserted in the Final Office Action. More particularly, Weisman teaches away from simultaneously co-displaying on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream, as required by each of independent claims 28 and 37. The edge detected and color quantization images displayed along with the speckle reduced image of Weisman are both generated from the speckle reduced image. Therefore, the edge detected and color quantization images each include the same speckle reduction parameters as the speckle reduced image. Weisman therefore teaches away from the multiple processed images displayed by Bloom. For example, rather than applying different speckle reduction parameters to the same raw image and selecting the best one therefrom, Weisman explains that "once the above [speckle reduction] filtering is applied to the video sequences and the image is captured at step 200, it is determined by the user whether or not to proceed with further processing" before applying the edge detection and color quantization filters. (See column 8, lines 26-28 of Weisman). In other words, rather than comparing differently speckle reduced images, Weisman describes applying further speckle reduction to the already speckle reduced images. In contrast to providing different levels of picture quality for selection of the best image, the raw data image, speckle reduced image, edge detected image, and color quantization image of Weisman are co-displayed to present the operator with different images of cardiac function to allow a user to view different physiological aspects.

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At least in view of the above arguments, the Final Office Action has not satisfied the requirements of KSR and 35 U.S.C. § 103 and therefore fails to set forth a prima facie obvious rejection.

Additionally, Appellants submit that Weisman and Bloom both individually fail to describe filtering a processed data stream with a first value set of speckle reduction parameters to produce a first image data stream, and filtering the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set, as recited by each of claims 28 and 37. Weisman does not describe that the same raw image is separately applied with two different levels of speckle. Weisman merely describes that the amount of speckle for a raw image can be selected as light, heavy, or moderate. Column 13, lines 1-10 of Weisman states that the physician can select the options of speckle reduction, border detection, and color quantization. When selecting speckle reduction, Weisman describes that the default level of speckle reduction is moderate, but instead of the default moderate speckle, the physician may choose light or heavy speckle. In other words, the raw image may be processed with light, moderate, or heavy speckle. Nowhere does Weisman describe that a physician can or does filter the raw image initially with a light, moderate, or heavy speckle reduction, and thereafter filters the same raw image with a different level of speckle reduction. Accordingly, although Weisman describes initially selecting between different levels of speckle reduction, applying different levels of speckle reduction *to the same raw image* is not a known element within Weisman.

Bloom also does not describe applying different speckle reduction parameters to the same raw image. Rather, Bloom does not even describe the filtering process of speckle reduction.

Bloom describes processing the images captured by the digital camera for contrast, tone mapping, sharpness, and illuminant correction. However, nowhere does Bloom describe the filtering process of speckle reduction. Accordingly, Bloom does not describe applying different speckle reduction parameters to the same raw image. Because Weisman and Bloom each individually fail to describe one or more elements of each of claims 28 and 37, it follows that a combination of Weisman and Bloom cannot describe such element(s).

For at least the reasons set forth above, the rejection of claims 28 and 37 under 35 U.S.C. §103 (a) as being unpatentable over Weisman in view of Bloom is improper and should be withdrawn.

B.   Claims 30, 32, 34, and 35 - Rejected under § 103 As Unpatentable over Weisman in view of Bloom

Dependent claims 30, 32, 34, and 35 depend from claim 28. Appellants submit that claims 30, 32, 34, and 35 recite further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, at least because claim 28 defines allowable subject matter, dependent claims 30, 32, 24, and 35 also each recite allowable subject matter.

For at least the reasons set forth above, the rejection of claims 30, 32, 34, and 35 under 35 U.S.C. §103(a) as being unpatentable over Weisman in view of Bloom is improper and should be withdrawn.

C.   Claim 29 - Rejected under § 103 As Unpatentable over Weisman and Bloom in view of Hatfield

Dependent claim 29 depends from claim 28. Appellants submit that claims 29 recites further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, Hatfield does not make up for the deficiencies of Weisman and Bloom. In particular, Hatfield does not describe simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Hatfield merely describes a method for automatically adjusting the contrast of a projected ultrasound image, which does not include simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Appellants therefore submit that at least because claim 28 defines allowable subject matter, dependent claim 29 also recites allowable subject matter.

For at least the reasons set forth above, the rejection of claim 29 under 35 U.S.C. §103(a) as being unpatentable over Weisman and Bloom in view of Hatfield is improper and should be withdrawn.

D.   Claim 31 - Rejected under § 103 As Unpatentable over Weisman and Bloom in view of Hwang

Dependent claim 31 depends from claim 28. Appellants submit that claims 31 recites further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, Hwang does not make up for the deficiencies of Weisman and Bloom. Specifically, Hwang does not describe simultaneously co-displaying first and second images that

are speckle-reduced using the speckle reduction parameters of different first and second value sets. Hwang describes an adaptive temporal filter means for temporal compounding of a medical ultrasound image. But, the temporal compounding technique of Hwang does not include simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Appellants therefore submit that at least because claim 28 defines allowable subject matter, dependent claim 31 also recites allowable subject matter.

For at least the reasons set forth above, the rejection of claim 31 under 35 U.S.C. §103(a) as being unpatentable over Weisman and Bloom in view of Hwang is improper and should be withdrawn.

E.   Claim 33 - Rejected under § 103 As Unpatentable over Weisman and Bloom in view of Kamath

Dependent claim 33 depends from claim 28. Appellants submit that claims 33 recites further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, Kamath does not make up for the deficiencies of Weisman and Bloom. In particular, Kamath does not describe simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Rather, Kamath was cited merely for the assertion that Kamath describes dividing a processed data stream into data subsets, simultaneously filtering the data subsets using a speckle reduction filter to produce filtered data subsets, and producing the first image data stream based on the filtered data subsets. Appellants therefore submit that at least because claim 28 defines

allowable subject matter, dependent claim 33 also recites allowable subject matter.

For at least the reasons set forth above, the rejection of claim 33 under 35 U.S.C. §103(a) as being unpatentable over Weisman and Bloom in view of Kamath is improper and should be withdrawn.

F.   Independent Claim 36 - rejected under § 103 As Unpatentable over Weisman and Bloom in view of Prater

Independent claim 36 recites an ultrasound system including a scan converter and display controller configured to "filter the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream", "filter the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set", and "simultaneously co-display on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream."

Claim 36 is submitted to be patentable over the cited references for at least the reasons set forth above with respect to claims 28 and 37. As discussed above, the Final Office Action fails to set for a prima facie case of obviousness at least because there is no legitimate reason to combine Weisman with Bloom. Additionally, neither Weisman nor Bloom describes simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Prater does not make up for the deficiencies of Weisman and Bloom. In particular, Prater does not describe simultaneously co-

displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Rather, Prater was cited merely for the assertion that Prater teaches a beamformer.

For at least the reasons set forth above, the rejection of claim 36 under 35 U.S.C. §103 (a) as being unpatentable over Weisman and Bloom in view of Prater is improper and should be withdrawn.

G. Independent Claims 38 and 46 - rejected under § 103 As Unpatentable over Weisman and Bloom in view of Kamath

Independent claim 38 recites a method for implementing a speckle reduction filter, wherein the method includes "changing values of the speckle reduction parameters between different first and second value sets to form first and second image data streams", and "simultaneously co-displaying a first image and a second image on a common screen, wherein the first image is generated from the first image data stream, and wherein the second image is generated from the second image data stream, and further wherein the first image and the second image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively." Independent claim 46 recites a computer readable medium storing a computer program which, when executed by a processor, causes the processor to perform a method. The method includes "changing values of the speckle reduction parameters between different first and second value sets to form first and second image data streams", and "simultaneously co-displaying a first image and a second image on a common screen, wherein the first image is generated from the first image data stream, and

wherein the second image is generated from the second image data stream, and further wherein the first image and the second image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively."

Claim 38 and 46 are each submitted to be patentable over the cited references for at least the reasons set forth above with respect to claims 28 and 37. As discussed above, the Final Office Action fails to set for a prima facie case of obviousness at least because there is no legitimate reason to combine Weisman with Bloom. Additionally, neither Weisman nor Bloom describes simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Kamath does not make up for the deficiencies of Weisman and Bloom. Specifically, Kamath does not describe simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Rather, Kamath was cited merely for the assertion that Kamath describes dividing a processed data stream into data subsets, simultaneously filtering the data subsets by using a speckle reduction filter to produce filtered data subsets, and producing an image data stream based on the filtered data subsets.

For at least the reasons set forth above, the rejection of claims 38 and 46 under 35 U.S.C. §103 (a) as being unpatentable over Weisman and Bloom in view of Kamath is improper and should be withdrawn.

H.   Claims 40, 42, 44, and 45 - Rejected under § 103 As Unpatentable over Weisman and Bloom in view of Kamath

Dependent claims 40, 42, 44, and 45 depend from claim 38. Appellants submit that claims 40, 42, 44, and 45 recite further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, at least because claim 38 defines allowable subject matter, dependent claims 40, 42, 44, and 45 also each recite allowable subject matter.

For at least the reasons set forth above, the rejection of claims 40, 42, 44, and 45 under 35 U.S.C. §103(a) as being unpatentable over Weisman and Bloom in view of Kamath is improper and should be withdrawn.

I.   Claim 39 - Rejected under § 103 As Unpatentable over Weisman, Bloom, and Kamath in view of Hatfield

Dependent claim 39 depends from claim 38. Appellants submit that claim 39 recites further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, Hatfield does not make up for the deficiencies of Weisman, Bloom, and Kamath. In particular, Hatfield does not describe simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Hatfield merely describes a method for automatically adjusting the contrast of a projected ultrasound image, which does not include simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Appellants therefore submit that at least because claim 38 defines allowable subject matter, dependent claim 39 also recites allowable subject matter.

For at least the reasons set forth above, the rejection of claim 39 under 35 U.S.C. §103(a) as being unpatentable over Weisman, Bloom, and Kamath in view of Hatfield is improper and should be withdrawn.

J.   Claim 41 - Rejected under § 103 As Unpatentable over Weisman and Kamath in view of Hwang

Dependent claim 41 depends from claim 38. Appellants submit that claim 41 recites further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, Hwang does not make up for the deficiencies of Weisman and Kamath. Specifically, Hwang does not describe simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Hwang describes an adaptive temporal filter means for temporal compounding of a medical ultrasound image. But, the temporal compounding technique of Hwang does not include simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Appellants therefore submit that at least because claim 38 defines allowable subject matter, dependent claim 41 also recites allowable subject matter.

For at least the reasons set forth above, the rejection of claim 41 under 35 U.S.C. §103(a) as being unpatentable over Weisman in view of Kamath and Hwang is improper and should be withdrawn.

K.   Claim 43 - Rejected under § 103 As Unpatentable over Weisman and Kamath in view of Examiner's Official Notice

Dependent claim 43 depends from claim 38. Appellants submit that claim 43 recites further subject matter that is not anticipated or rendered obvious by the cited references. Additionally, the Examiner's Official Notice does not make up for the deficiencies of Weisman and Kamath. Rather, the Examiner's Official Notice was cited merely for the assertion that a SIMD processor is known for simultaneously processing data. Appellants therefore submit that at least because claim 38 defines allowable subject matter, dependent claim 43 also recites allowable subject matter.

For at least the reasons set forth above, the rejection of claim 43 under 35 U.S.C. §103(a) as being unpatentable over Weisman and Kamath in view of Examiner's Official Notice is improper and should be withdrawn.

L.   Independent Claim 47 - rejected under § 103 As Unpatentable over Weisman, Bloom, and Kamath in view of Prater

Independent claim 47 recites an ultrasound imaging system including a scan converter and display controller that is configured to "change values of the speckle reduction parameters between different first and second value sets to form first and second image data streams", and "simultaneously co-display a first image and a second image on a common screen, wherein the first image is generated from the first image data stream, and wherein the second image is generated from the second image data stream, and further wherein the first image and the second

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image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively."

Claim 47 is submitted to be patentable over the cited references for at least the reasons set forth above with respect to claims 28 and 37. As discussed above, the Final Office Action fails to set for a prima facie case of obviousness at least because there is no legitimate reason to combine Weisman with Bloom. Additionally, neither Weisman nor Bloom describes simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Neither Kamath nor Prater makes up for the deficiencies of Weisman and Bloom. In particular, neither Kamath nor Prater describes simultaneously co-displaying first and second images that are speckle-reduced using the speckle reduction parameters of different first and second value sets. Rather, Kamath was cited merely for the assertion that Kamath describes dividing a processed data stream into data subsets, simultaneously filtering the data subsets by using a speckle reduction filter to produce filtered data subsets, and producing an image data stream based on the filtered data subsets. Prater was cited merely for the assertion that Prater describes a beamformer.

For at least the reasons set forth above, the rejection of claim 47 under 35 U.S.C. §103 (a) as being unpatentable over Weisman, Bloom, and Kamath in view of Prater is improper and should be withdrawn.

In view of the above, Appellants respectfully request that the rejections of all pending claims be withdrawn, and the pending claims allowed.

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VIII. CLAIMS APPENDIX

1-27. (canceled)

28. (rejected) A method for implementing a speckle reduction filter comprising:

receiving a processed data stream from a processor;

filtering the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream;

filtering the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set; and

simultaneously co-displaying on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream.

29. (rejected) The method according to claim 28, further comprising increasing a range over which values of data included in at least one of the first and second image data streams are distributed to improve contrast of at least one the first and second speckle-reduced images.

30. (rejected) The method according to claim 28, wherein simultaneously co-displaying comprises simultaneously co-displaying in a dual display mode, said method further comprising enabling a user to enter the dual display mode at least one of during a scan, while a replay of pre-

recorded cine loops is displayed on a screen, and while a still image that is not updated periodically is displayed on the screen.

31. (rejected) The method according to claim 28, further comprising automatically, without user intervention, optimizing at least one of the first and second value sets of speckle reduction parameters based on a scan of an imaging system and what is being imaged.

32. (rejected) The method according to claim 28, wherein simultaneously co-displaying further comprises co-displaying an original unfiltered image on the common screen with the first and second speckle-reduced images, wherein the original unfiltered image is generated from the processed data stream.

33. (rejected) The method according to claim 28, wherein filtering the processed data stream with a first value set of speckle reduction parameters comprises:

dividing the processed data stream into data subsets;

simultaneously filtering the data subsets using a speckle reduction filter to produce filtered data subsets; and

producing the first image data stream based on the filtered data subsets.

34. (rejected) The method according to claim 28, wherein the first speckle-reduced image has less speckle reduction than the second speckle-reduced image.

35. (rejected) The method according to claim 28, wherein filtering the processed data stream with a second value set of speckle reduction parameters comprises changing the values of

the first value set of speckle reduction parameters during at least one of a scan, while a replay of pre-recorded cine loops is displayed on the screen, and while a still image that is not updated periodically is displayed on the screen.

36. (rejected) An ultrasound imaging system comprising:

a transducer array;

a beamformer;

a processor for processing a receive beam from the beamformer;

a scan converter and display controller operationally coupled to the transducer array, the beamformer, and the processor, the scan converter and display controller configured to:

receive a processed data stream from the processor;

filter the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream;

filter the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set; and

simultaneously co-display on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream.

37. (rejected) A computer readable medium storing a computer program which, when executed by a processor, causes the processor to perform a method comprising:

receiving a processed data stream from a processor;

filtering the processed data stream with a first value set of speckle reduction parameters to produce a first image data stream;

filtering the processed data stream with a second value set of speckle reduction parameters to produce a second image data stream, wherein the second value set of speckle reduction parameters is different than the first value set; and

simultaneously co-displaying on a common screen a first speckle-reduced image that is generated from the first image data stream and a second speckle-reduced image that is generated from the second image data stream.

38. (rejected) A method for implementing a speckle reduction filter comprising:

receiving a processed data stream from a processor;

dividing the processed data stream into data subsets;

simultaneously filtering the data subsets by using a speckle reduction filter to produce filtered data subsets; and

producing an image data stream based on the filtered data subsets,

wherein the filtering step is based on adjustable speckle reduction parameters, the method further comprising:

changing values of the speckle reduction parameters between different first and second value sets to form first and second image data streams; and

simultaneously co-displaying a first image and a second image on a common screen, wherein the first image is generated from the first image data stream, and wherein the second image is generated from the second image data stream, and further wherein the first image and the second image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively.

39. (rejected) The method according to claim 38, further comprising increasing a range over which values of data included in at least one of the first and second image data streams are distributed to improve contrast of at least one the first and second images.

40. (rejected) The method according to claim 38, wherein simultaneously co-displaying comprises simultaneously co-displaying in a dual display mode, said method further comprising enabling a user to enter the dual display mode at least one of during a scan, while a replay of pre-recorded cine loops is displayed on a screen, and while a still image that is not updated periodically is displayed on the screen.

41. (rejected) The method according to claim 38, further comprising automatically, without user intervention, optimizing the speckle reduction parameters based on a scan of an imaging system and what is being imaged.

42. (rejected) The method according to claim 38, wherein simultaneously co-displaying further comprises co-displaying an original unfiltered image on the common screen with the first and second images, wherein the original unfiltered image is generated from the processed data stream.

43. (rejected) The method according to claim 38, wherein simultaneously filtering the data subsets comprises simultaneously filtering the data subsets using a Single Instruction-Stream, Multiple Data-Stream (SIMD) processor.

44. (rejected) The method according to claim 38, wherein the first image has less speckle reduction than the second image.

45. (rejected) The method according to claim 38, wherein changing values of the speckle reduction parameters between different first and second value sets comprises changing the values of the speckle reduction parameters during at least one of a scan, while a replay of pre-recorded cine loops is displayed on the screen, and while a still image that is not updated periodically is displayed on the screen.

46. (rejected) A computer readable medium storing a computer program which, when executed by a processor, causes the processor to perform a method comprising:

receiving a processed data stream from a processor;

dividing the processed data stream into data subsets;

simultaneously filtering the data subsets by using a speckle reduction filter to produce filtered data subsets; and

producing an image data stream based on the filtered data subsets,

wherein the filtering step is based on adjustable speckle reduction parameters, the method further comprising:

changing values of the speckle reduction parameters between different first and second value sets to form first and second image data streams; and

simultaneously co-displaying a first image and a second image on a common screen, wherein the first image is generated from the first image data stream, and wherein the second image is generated from the second image data stream, and further wherein the first image and the second image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively.

47. (rejected) An ultrasound imaging system comprising:

a transducer array;

a beamformer;

a processor for processing a receive beam from the beamformer;

a scan converter and display controller operationally coupled to the transducer array, the beamformer, and the processor, the scan converter and display controller configured to:

receive a processed data stream from the processor;

divide the processed data stream into data subsets;

simultaneously filter the data subsets by using a speckle reduction filter to produce filtered data subsets; and

produce an image data stream based on the filtered data subsets,

wherein the filtering step is based on adjustable speckle reduction parameters, the scan converter and display controller further configured to:

change values of the speckle reduction parameters between different first and second value sets to form first and second image data streams; and

simultaneously co-display a first image and a second image on a common screen, wherein the first image is generated from the first image data stream, and wherein the second image is generated from the second image data stream, and further wherein the first image and the second image are speckle-reduced images using the speckle reduction parameters of the first value set and the speckle reduction parameters of the second value set, respectively.

IX.   EVIDENCE APPENDIX

None.

X.　　RELATED PROCEEDINGS APPENDIX

None.